

Chapter 2

Alternatives Considered

Minor changes to the proposed action alternative have been made since the proposed action was mailed out to the public for scoping comments, based on field verification and meetings with adjacent private property owners. Changes include: addition of the herbicide chlorsulfuron for treatment of the invasive plant weed tall whitetop, the substitution of radius treatments for broadcast treatments along portions of some roads, an increase in the non-herbicide buffers along perennial streams (including those used as a domestic water source for the town of Kyburz), elimination of gopher control activities, a reduction in initial planting acres to reflect acres planted under Decision Memos, brush cutting to access several units, a reduction in acres of shrub and excess tree mastication treatments, and refinement of planting and release treatments near meadows. Best Management Practices listed in the design criteria have been updated to address proposed activities.

Alternative 1 (Proposed Action and Preferred Alternative)

Alternative 1 is the Forest Service's preferred alternative. The proposed action includes the following activities:

Reforestation

Plant by hand a mixture of conifer species (ponderosa pine, Jeffrey pine, sugar pine, Douglas fir, incense cedar, white fir, and red fir) as displayed in Table 2-1, below, on approximately 1,322 acres. Trees would be planted in groups of two or three, with group centers approximately 17 feet (+/- 25%) apart. Planting sites (14"-24" diameter) would be scalped, if needed, to expose mineral soil for planting.

No conifer planting would occur on approximately 350 acres, including

- Snag retention patches (as described in the Freds Fire Restoration FEIS)
- Granite Springs Wildlife Water Development Restoration Area
- Heritage resource sites
- Sensitive plant sites
- Areas with groups of natural conifer regeneration greater than 6" tall
- Low intensity burn areas where live tree stocking exceeds 50 trees per acre (including oaks)
- Within riparian vegetation
- For 100 feet below the Sugarloaf rock formation
- Within 20 feet of the crown dripline of mature live, or sprouting, hardwoods, including 125 acres of oak stands.
- Areas adjacent to special aquatic features (refer to Resource Protection Measures, below)

About 1,868 acres within the project area have been planted between 2005 and 2009.

Conifer planting on about 925 acres of oak or mixed conifer/oak type in stands 609-027, 609-030, 609-033, and 609-046, would occur at a reduced density by not planting within 20 feet of the dripline of a mature live, or sprouting, oak crown.

Where seedling mortality threatens plantation failure (less than 100 trees per acre and less than 60 percent stocked) replant or interplant by hand a mixture of conifer species (ponderosa pine,

Jeffrey pine, sugar pine, Douglas fir, incense cedar, white fir, and red fir) on approximately the project area (3,320 acres). Currently, about 665 acres would be replanted or interplanted. Trees would be planted in groups of two or three, with group centers approximately 17 feet (+/- 25%) apart. Planting sites (14"-24" diameter) would be scalped, if needed, to expose mineral soil for planting. Evaluate opportunities to provide patches (<1 acre) of early seral vegetation, potentially by limiting interplanting on some sites with high seedling mortality.

Seedlings grown from seed of local origin would be used. When seed of local origin is unavailable, seed would be transferred in compliance with seed transfer rules based on California Tree Seed Zones, (J. Buck et al. 1971; also refer to R-5 FSH 2409.26, Section 42.2).

Site Preparation and Release

Hand apply herbicides (glyphosate, triclopyr, and/or hexazinone) to shrubs and grass by broadcast method or within a 5 feet radius of trees (refer to Table 2-1). Prior to herbicide application, brush may be cut on portions of units 613-6, 25, 26, 35, 37, 38, and 42 for access.

Initial Treatments: Glyphosate is proposed as an initial treatment. This type of application can be used to treat grass and forb species, and shrub species such as bear clover, manzanita, cherry, and *ceonothus*. In unplanted areas, the initial treatment would be applied by hand the year prior to planting (site prep) to control vegetation and make the area accessible for planting. On previously planted areas, the initial treatment would be a release treatment.

Most areas would receive a broadcast application of herbicides. Radius treatments would occur adjacent to Cleveland Fire units, along portions (estimated 122 acres) of roads 11N38, 11N38A, 11N38G, 11N38K, 11N42, 11N42A, 11N42D, 11N99, and 11N99F and within ¼ mile of Highway 50 (estimated 388 acres) to limit the potential for invasive plant spread.

Follow-up Treatments: Hand apply glyphosate, triclopyr, or hexazinone as a follow-up treatment on about 3,320 acres. Triclopyr is proposed for treatment of woody brush species such as bearclover, manzanita, and chinquapin. Extensive resprouting is usually eliminated with this type of treatment. Hexazinone is proposed for treatment of grasses and forbs. This type of treatment can affect seed germination, with decreasing effectiveness, for two to three seasons after application. In all other units, glyphosate would be used as a follow-up treatment. Table 2-2 displays acres by proposed treatment type.

Follow-up treatments of glyphosate or triclopyr would be applied in a radius around planted trees, with selected shrubs targeted outside of this radius to reduce live cover outside this five foot radius to 20 percent. The herbicide applications are intended to facilitate tree survival by reducing competition, maintaining vegetation in a grass/shrub type fuel model, and allowing some shrub and herbaceous vegetation development interspersed between the groups of trees.

Chemical applications would be restricted to ground-based applications. Additives in the form of colorants and adjuvants would be added to the herbicide mixtures. Table 2-3 displays the herbicides, application rates, and additives proposed for use.

Hand grubbing in a radius around trees in lieu of herbicides would be used within no-spray buffers of seasonal streams (refer to resource protection measures, below).

Invasive Plant Control

Hand apply clopyralid or glyphosate for yellow starthistle (estimated 72 acres) and chlorsulfuron or glyphosate for tall whitetop (estimated ¼ acre). Application of clopyralid would be made to plants or to the ground where yellow starthistle plants exist or are expected to germinate. Clopyralid would be applied while starthistle plants are primarily in the rosette to bolting stage,

prior to the spiny stage. A glyphosate herbicide labeled for aquatic use (such as Rodeo), would be substituted for clopyralid within portions of streamside zones, and would be applied as a contact herbicide. It is anticipated that multiple treatments would be necessary to treat missed or recently germinated, plants. Follow-up treatments, based on herbicide effectiveness monitoring, would consist of chemical treatment using the herbicide glyphosate, used as a spot application.

Individual sites may be treated up to two times in one year (one clopyralid application and one glyphosate or two glyphosate applications), depending on the efficacy of treatments. Mechanical methods, such as hand pulling or grubbing, would also be employed. Treatments may continue for up to ten years.

Application of chlorsulfuron to tall whitetop would be made while plants are primarily in the flower bud stage. Follow-up treatments may be repeated yearly, based on herbicide effectiveness monitoring. Application of glyphosate to tall whitetop would be made to the plant. Follow-up treatments may be repeated yearly, based on herbicide effectiveness monitoring. Mechanical methods, such as hand pulling or tarping, would also be employed. Treatments may continue for up to ten years.

Table 2-1 Proposed Treatments by Stand – Alternative 1

STAND	Approx Stand Acres	Approx Treatment Acres	Planted Acres to Date ¹	Initial Plant Acres	Herbicide Treatment ²	Comment
503-006	3	0	0		None	
503-008	40	3	3		glyphosate	
503-009	4	4	4		glyphosate	
503-027	36	2	2		glyphosate	
503-111	5	5	5		glyphosate	
503-112	55	0	0		None	Snag Patch ⁴
503-113	23	0	0		None	
609-010	76	76	76		glyphosate/triclopyr	
609-025	71	71	71		glyphosate	
609-026	32	32	32		glyphosate	
609-027	254	254	78	170	glyphosate	oak ³
609-029	36	36	36		glyphosate	
609-030	373	373	47	304	glyphosate	oak
609-031	60	0	0		None	Snag Patch
609-032	47	0	0		None	Snag Patch
609-033	763	763	48	645	glyphosate	oak
609-034	20	20	20		glyphosate/triclopyr	
609-035	123	0	0		None	
609-036	28	28	28		glyphosate/hexazinone	
609-037	54	54	54		glyphosate	
609-038	21	21	21		glyphosate/hexazinone	
609-039	22	22	22		glyphosate/hexazinone	
609-040	27	27	27		glyphosate/hexazinone	
609-041	29	29	29		glyphosate	
609-042	66	66	66		glyphosate	
609-043	49	49	49		glyphosate	

STAND	Approx Stand Acres	Approx Treatment Acres	Planted Acres to Date ¹	Initial Plant Acres	Herbicide Treatment ²	Comment
609-044	37	37	37		glyphosate	
609-046	280	280	70	203	glyphosate	oak
613-005	120	120	120		glyphosate	
613-006	96	96	96		glyphosate	
613-007	17	17	17		glyphosate	
613-010	6	6	6		glyphosate	
613-022	28	28	28		glyphosate	
613-025	89	89	89		glyphosate	
613-026	19	19	19		glyphosate	
613-031	1	0	0		None	
613-035	150	150	150		glyphosate	
613-037	113	113	113		glyphosate	
613-038	51	51	51		glyphosate	
613-042	40	40	40		glyphosate	
613-047	32	32	12		glyphosate	
613-050	55	55	55		glyphosate	
613-051	90	90	90		glyphosate	
613-052	76	76	76		glyphosate	
613-053	153	38	38		glyphosate	Balance of unit green
613-054	43	43	43		glyphosate	
Total	3,816	3,319	1,868	1,322		

¹ Planted under existing Decision Memos

² glyphosate-initial and follow-up treatments, glyphosate/triclopyr–glyphosate initial treatment, triclopyr follow-up treatment, glyphosate/hexazinone – glyphosate initial treatment, hexazinone follow-up treatment

³ Oak- Stands with portions that are oak, or where oak is a component of a mixed conifer/oak type

⁴ Snag Patch – Unharvested stand

Table 2-2 Acres of Proposed Treatments by Treatment Type

	Glyphosate, with glyphosate follow-up	Glyphosate, with triclopyr follow-up	Glyphosate, with hexazinone follow-up
Acres	3,120	97	99

Fuel Reduction

Five years following planting, masticate shrubs in the defense zone within ¼ mile of Highway 50 (maximum estimated 388 acres) to reduce surface and ladder fuels to reduce wildfire spread and intensity. Mastication would be limited to slopes generally less than 35%,

Resource Protection Measures

Standard procedures for resource protection would be adhered to during project implementation. These requirements come from standards and guidelines in the Eldorado National Forest Land

and Resource Management Plan (LRMP), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (2004); standard policies and guidelines included in the Forest Service Handbook; compliance with laws and regulations; and Best Management Practices (BMPs) as defined by the State of California, and input provided by the interdisciplinary team for this project. These resource protection measures include the following:

Chemical application would be restricted to ground-based applications. Additives in the form of colorants and adjuvants would be added to the herbicide mixtures. An adjuvant that acts as a surfactant would be added to help the herbicide mixture absorb into the plant. Surfactants proposed for use include nonylphenol polyethoxylate based (NPE) surfactants, methylated seed oil (MSO) based surfactants, and a silicone/modified vegetable oil blend. A colorant or dye would be added to liquid formulations to determine location of coverage. The application rates for each of the herbicides and adjuvants proposed for use would be in accordance with each material's label instructions. Table 2-3 displays the herbicides, application rates, and additives proposed for use.

Table 2-3 - Herbicide Formulations, Application Rates and Additives

Herbicide Formulation	Application Rate (pounds/acre)	Additives
Site Preparation and Release Treatments		
glyphosate (Accord or equivalent formulation)	2.7 - 4.8 lbs/acre (ae)	NPE-based or silicone/MSO blend surfactant, Colorfast Purple dye
hexazinone (granular - Pronone or equivalent formulation)	2.0 - 3.0 lbs/acre (ae)	none
triclopyr (Garlon 4 or equivalent formulation)	1.6 - 2.4 lb./acre (ae)	MSO-based or silicone/MSO blend surfactant, Colorfast Purple dye
Invasive Plant Treatments		
glyphosate (Accord or equivalent formulation)	2.7 lbs/acre (ae)	NPE-based or silicone/MSO blend surfactant, Colorfast Purple dye
glyphosate (Rodeo or equivalent formulation)	2.7 lbs/acre (ae)	MSO-based surfactant, Hi-Light blue dye
clopyralid (Transline)	0.25 lbs/acre (ae)	NPE-based or silicone/MSO blend surfactant, Colorfast Purple dye
chlorsulfuron (Telar)	0.047–0.14 lbs/acre (ai)	NPE-based or silicone/MSO blend surfactant, Colorfast Purple dye

ae – acid equivalent, ai – active ingredient

All appropriate laws and regulations governing the use of pesticides, as required by the U.S. Environmental Protection Agency, the California Department of Pesticide Regulation, and Forest Service policy pertaining to pesticide use, would be followed. Coordination with the appropriate County Agricultural Commissioners would occur, and all required licenses and permits would be obtained prior to any pesticide application. In addition to existing laws and regulations, several additional practices would be employed to increase safety. These include restrictions location of equipment and additional personal protective equipment. A site-specific safety and spill plan would be developed to address site-specific attributes of proposed units.

To inform the public of pesticide applications: Each treatment unit would be posted with a clearly visible sign along likely access points that the unit has been treated with pesticides. The

specific pesticide would be identified, the treatment date specified, and the name and phone number of the appropriate Forest Service contact would be identified.

To protect archaeological resources at risk from ground disturbing project activities:

Cultural resource sites would be flagged or otherwise designated. Tree planting and hand pulling of invasive plants would not take place within these sites.

To prevent introduction of invasive plants: Prior to entering ENF lands equipment must be free of material that may contain seeds of invasive plants. Unless the prior location of operation is known to be free of invasive plants as documented in a Weed Risk Assessment, Forest Service may assume that the equipment is contaminated with invasive plant seeds and cleaning/washing will be required.

To protect sensitive plants: Conduct field surveys in the spring to verify the suitability of potential habitat for sensitive plants. Known occurrences of Pleasant Valley mariposa lily (*Calochortus clavatus*) would be flagged or otherwise designated by a trained Botanist. Tree planting and chemical treatments would not take place within these occurrences. Hand treatments (hand pulling or cutting) of invasive plants would be allowed after sensitive plant flowering and seed set. Any new occurrences of sensitive species within the project area will be flagged and protected by avoidance.

To protect perennial streams and special aquatic features:

- Meadow adjacent to a tributary of Fry Creek (within Unit 613-35 and 613-37) - No planting or release treatments within 150 feet of the edge of the meadow.
- Granite Springs Area– No planting or release treatments within 75 feet of meadows in the vicinity of Granite Springs (*exception*: 50 foot no planting or release treatment along the south and east edge of Granite Springs Meadow/Spring complex).
- Conifers would be planted at a reduced density in the portion of Unit 615-50 north and west of Granite Springs Meadow/Spring complex. Trees would be planted in groups of two or three, with group centers 40 to 50 feet apart.
- Perennial streams – No conifer release treatments (hand or herbicide) or brush cutting would occur within 50 feet of the edge of the stream channel. Between 50 and 100 feet from the edge of the stream channel, conifer release treatments would maintain at least 50 percent live ground cover.

To protect sensitive wildlife species:

- Maintain a limited operating period (LOP), prohibiting activities within ¼ mile of known spotted owl nest sites during the breeding season (March 1 to August 31) unless surveys confirm that California spotted owls are not nesting.
- Use screening devices for water drafting pumps. Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles, from aquatic habitats.
- Maintain sufficient trees following thinning to quickly achieve 70 percent crown closure to meet desired conditions east of Granite Springs Meadow (portions of unit 613-50 and 613-51). Evaluate opportunities to interplant to create multi-layered stand conditions.
- **To protect oaks:** Oaks would not be intentionally sprayed, including seedlings, sprouts, and larger trees. Hexazinone would not be applied within the dripline of sugar pine or incense cedar greater than 5 inches diameter.

Transportation: No road construction is proposed.

To protect soils: Region 5 Soil Quality Standards would be met. Within 100 feet of perennial streams a minimum of 75% ground cover, where it currently exists, would be retained thru all release treatments.

To protect water quality: Compliance with the Clean Water Act is demonstrated through the implementation of Best Management Practices (BMPs) certified by the state, and then monitoring to determine if the appropriate Central Valley Regional Water Quality Control Board standards are met. These BMPs are designed to prevent degradation of downstream water quality. Water Quality Management for Forest Service Lands in California - Best Management Practices (2000) describes the BMPs that are referenced in the Land and Resource Management Plan. BMPs that are pertinent to the use of pesticides are BMPs 5-7, 5-8, 5-9, 5-10, 5-11, 5-12, and 5-13; they are described below

Practice 5-7 – Pesticide Use Planning Process

A hydrologist, fisheries biologist soil scientist, silviculturist, fuels specialist, geologist, archeologist and wildlife biologist are members of the ID team for this project. They have evaluated soil and watershed responses to the proposed herbicide applications and provided criteria for identifying sensitive areas to be avoided or needing additional protection. They identified specific mitigation measures for these areas as documented in the FEIS and the following BMPs. They also evaluated soil and watershed responses to proposed activities. (ID Team - During Planning and Analysis Process)

Practice 5-8 - Pesticide Application According to Label Directions and Applicable Legal Requirements

All pesticide applications are required to follow label instructions and restrictions for use to avoid water contamination by complying with all label instructions and restrictions for use. Pesticide label directions for application rates and methods, mixing, and container disposal will be followed. Representative soil samples would be taken on units proposed for hexazinone treatments to determine application rate. Label directions will be followed on all pesticides, dyes, and adjuvants. All pesticide applications will adhere to all appropriate laws and regulations governing the use of pesticides, as required by the U.S. Environmental Protection Agency, the California Department of Pesticide Regulation, CalEPA regulations and safety regulations, and Forest Service policy pertaining to pesticide-use. Coordination with the appropriate County Agricultural Commissioners will occur, and all required licenses and permits would be obtained prior to any pesticide application. All Forest Service personnel in charge of projects involving pesticide application will be Qualified Applicator Certified. All contract applicators will be appropriately licensed by the state. These actions will effectively avoid the misuse of the herbicides used in this project and thus decrease the risk of contaminating water or applying to non-target areas. (Silviculturist, Culturist & Contract Representative responsible for application of pesticides)

Practice 5-9 - Pesticide Application Monitoring and Evaluation

Treatments are monitored and evaluated during application by the contract officer or representative to determine whether pesticides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects. All spray equipment would be calibrated to insure accuracy of delivered amounts of pesticide. Periodically during application, equipment would be rechecked for calibration. Colorants or dyes would be added to the herbicide mixture to determine placement. A site-specific water quality monitoring plan will be prepared for this project prior to project implementation. It would be implemented prior to application to determine baseline conditions. The forest hydrologist, soil scientist, and district silviculturist would evaluate the results of the monitoring. This monitoring would determine if

herbicides have moved off-site into water after application, through overland flow, leaching, or subsurface flow and would determine the amount of herbicide residue reaching water. This information would be critical to evaluating other protection measures. Post-project monitoring would determine the effectiveness of treatment in meeting the project objectives.

Practice 5-10 - Pesticide Spill Contingency Planning

To reduce contamination of water by accidental pesticide spills, a spill plan (project file) will be developed for this project. A copy will be retained onsite. It will be reviewed by all Forest Service personnel involved in the project, as well as by the contractor and the appropriate forest and district staff and line officers. Any herbicide application contract will contain clauses that will minimize the chances of herbicide spills (such as designating routes of travel and mixing sites, minimizing herbicide mix in tanks while traveling between units, requiring a separate water truck from the batch truck) and, if a spill occurs, outlining responses required by the contractor. Spill kits will be required in Forest Service and contractor vehicles on site and where contractor-supplied pesticides are stored. These actions would reduce the risk of contamination of water by accidental spills.

Practice 5-11 - Cleaning and Disposal of Pesticide Containers and Equipment

To prevent water contamination resulting from cleaning or disposal of pesticide containers all pesticide and adjuvant containers would be triple rinsed, with clean water, at a site approved by the Contracting Officer or Representative, or, in the case of application by Forest Service personnel, approved by the project director. The rinsate would be disposed of by placing it in the batch tank for application. Used containers would be punctured on the top and bottom to render them unusable after rinsing. Disposal of containers would be at legal dumpsites; certification of such disposal would be required prior to final payment on contract applications. Equipment would not be cleaned and personnel would not bathe in a manner that allows contaminated water to enter any body of water on the national forest.

Practice 5-12 - Streamside Wet Area Protection During Pesticide Spraying

To minimize the risk of pesticides reaching surface water and ground water, as well as altering the riparian area adjacent to aquatic features, areas of no herbicide use will be employed as described in Table 2-4. Buffer strip locations and width are based partly on results from water monitoring from previous years' pesticide application projects on the ENF. Monitoring showed that the size of those buffer strips was adequate to prevent degradation of downstream beneficial uses. Buffer width sizes are also based on the chemical properties and the labeled use of the herbicides being proposed. Using these two criteria, we estimate that these buffer strips would provide adequate protection for downstream beneficial uses.

Buffer strip boundaries would be flagged or otherwise designated on the ground. The contractor or project employees would be informed of the location and extent of each of the strips prior to treatment. Applications would be monitored by the Contracting Officer or project director to determine accurate placement. Spray application personnel would not be allowed into these buffers.

Table 2-4. Untreated Buffer Strips Adjacent to Aquatic Features

Pesticide(s)	Buffer width on each side of perennial streams¹	Buffer width on each side of all other streams^{1,4}	Buffer width for special aquatic features²	Buffer width for domestic water source¹
Glyphosate	50 feet	0 feet—stream not flowing. 25 feet -stream is flowing.	25 feet	50 feet
Glyphosate³ (aquatic label)	0 feet	0 feet	0 feet	50 feet
Triclopyr/ Clopyralid	50 feet	25 feet	50 feet	50 feet
Hexazinone	100 feet	100 feet	100 feet	NA

¹ As measured from the edge of the stream channel. If a defined channel is not present (draws do not have defined channels), measurement is from the bottom of the feature.

² As measured from the edge of the wet area surrounding the special aquatic feature. Special aquatic feature includes springs, seeps, bogs, fens, wet meadows, and all other wet areas.

³ When used as treatment for yellow starthistle control.

⁴ Including roadside ditches with water present.

Practice 5-13 - Controlling Pesticide Drift During Spray Applications

To minimize the risk of pesticide falling directly into water or non-target areas protection measures will be placed into the contract and project plans This includes: 1) using ground application equipment; 2) ceasing application when weather parameters exceed label requirements, precipitation, or forecast of greater than a 70% chance of precipitation in the next 24 hours (except hexazinone); 3) requiring a spray nozzle that produces a relatively large droplet; 4) requiring low nozzle pressures (15 psi); 5) requiring the spray nozzle be kept within 24 inches of vegetation being sprayed; 6) requiring a pressure gauge or pressure regulator on the backpack sprayers; 7) requiring a directed spray away from conifer seedlings and oaks as well as the use of physical barriers; and 8) requiring the use of a seedling wash-down solution for accidentally oversprayed seedlings.

BMP's that are pertinent to the use of mechanical equipment will be implemented. This includes: BMP's 1-6, 1-19, 2-12, 5-1, 5-2, 5-3, and 5-6.

Practice 1-6 – Protection of Unstable lands

To provide appropriate erosion and sedimentation protection for unstable areas there would be no ground-based entry of mastication equipment within 100 feet of any identified landslides, landslide prone lands or instabilities (such as mining ditches) or as determined by a geologist/soil scientist. This action would reduce the risk of triggering mass slope failure with resultant erosion and sedimentation.

Practice 1-19 - Streamcourse and Aquatic Protection

To control sediment and other pollutants from entering streamcourses, ground based entry of mastication equipment would not be allowed within 100 feet of perennial streams, lakes and reservoirs, meadows and springs, and 50 feet on each side of seasonal and ephemeral streams. Riparian vegetation would not be masticated.

Practice 2-12 - Servicing and Refueling of Equipment

To prevent pollutants from being discharged into streamcourses, all mechanized equipment will be refueled outside of Riparian Conservation Areas, if possible.

Practice 5-1 -Soil Disturbing/Treatments on the Contour

Sediment production and stream turbidity would be protected by minimizing the disturbance associated with turning of the equipment within the Riparian Conservation Areas.

Practice 5--2 - Slope Limitations for Mechanical Equipment Operation

To reduce gully and sheet erosion and associated sedimentation mechanical equipment will be restricted to slopes generally less than 35 percent. Within Riparian Conservation Areas, mechanical treatments would be minimized on moderate slopes (15-30 %) and restricted to slopes less than 30%.

Practice 5-3 - Tractor Operation is Limited in Wetlands and Meadows

To limit sedimentation in wetlands and meadows, mastication equipment would not be allowed within 50 feet of meadows, springs, and wetlands.

Practice 5-6 - Soil Moisture Limitations for Mechanical Equipment Operations

To prevent compaction, rutting, and gullyng mechanical treatment activities would be restricted and/or controlled during high soil moisture conditions.

Alternative 2 (No Action)

Under the No Action alternative current management plans would continue to guide the management of the project area. No reforestation or release would occur. No fuel treatments would occur. No invasive plant treatments would occur. Management activities with existing decision documents would continue to be implemented, which includes 1,868 previously planted and hand released acres.

Alternative 3

Alternative 3 was designed to address the issues brought forward by the public during scoping. Specifically, Alternative 3 addresses concerns that proposed use of herbicides could pose an unknown risk to humans, wildlife, and the environment, including Native American plant gatherers; proposed use of herbicides would leave standing dead brush that would pose an immediate fire hazard; proposed herbicide use could contaminate water; and proposed use of herbicides could create conditions more hospitable to invasive species. Alternative 3 is the same as Alternative 1 except as described below:

Reforestation

Approximately 592 acres would be planted under this alternative, using the same methods as Alternative 1. In addition to the approximately 350 acres of no planting areas under Alternative 1, no planting would occur on about 800 acres where bearclover as competing vegetation exceeds approximately 40% ground cover (refer to Table 2-5).

About 1,868 acres within the project area have been planted from 2005 to 2009.

Replanting/interplanting would occur as in Alternative 1, when seedling mortality threatens plantation failure (less than 100 trees per acre and less than 60 percent stocked). Currently, about 665 acres would be replanted or interplanted.

Site Preparation and Release

Initial Treatments: In unplanted areas, the initial treatment would be hand cutting of shrubs in approximately 4-5 feet radius the year prior to planting (site prep) to create planting spots make the area accessible for planting. On previously planted areas, the initial treatment of hand cutting/hand grubbing would be a release treatment, hand cutting/hand grubbing shrubs, forbs, and grass approximately 4-5 feet radius around planted trees.

Follow-up Treatments: Hand cut or hand grub annually up to 4 more years depending on the results of monitoring tree survival and shrub growth (refer to Monitoring section). The hand cutting/hand grubbing prescription is intended to facilitate tree survival by reducing competition from grasses, forbs, and shrubs while allowing shrub development interspersed among the groups of trees.

Invasive Plants

Employ mechanical methods, such as hand pulling or grubbing, to control yellow starthistle. It is anticipated that multiple treatments would be necessary to treat missed or recently germinated, plants. Follow-up treatments may be repeated yearly, based on effectiveness monitoring. Treatments may continue for up to ten years.

Employ mechanical methods, such as hand pulling or tarping, to control tall whitetop. It is anticipated that multiple treatments would be necessary to treat missed or recently germinated, plants. Follow-up treatments may be repeated yearly, based on effectiveness monitoring. Treatments may continue for up to ten years.

Fuel Reduction

Five years following planting, masticate shrubs in the defense zone within ¼ mile of Highway 50 (maximum estimated 388 acres) to reduce surface and ladder fuels which would reduce wildfire spread and intensity. Mastication would be limited to slopes generally less than 35%.

Table 2-5 Proposed Treatments by Stand – Alternative 3

STAND	Approx Stand Acres	Approx Treatment Acres	Planted Acres to Date ¹	Initial Plant Acres ²	Release Treatment	Comment
503-006	3	0	0		None	
503-008	40	3	3		hand cut/hand grub	
503-009	4	4	4		hand cut/hand grub	
503-027	36	2	2		hand cut/hand grub	
503-111	5	5	5		hand cut/hand grub	
503-112	55	0	0		None	Snag Patch ⁴
503-113	23	0	0		None	
609-010	76	76	76		hand cut/hand grub	
609-025	71	71	71		hand cut/hand grub	
609-026	32	32	32		hand cut/hand grub	
609-027	254	96	78	12	hand cut/hand grub	oak ³
609-029	36	36	36		hand cut/hand grub	
609-030	373	247	47	178	hand cut/hand grub	oak
609-031	60	0	0		None	Snag Patch

STAND	Approx Stand Acres	Approx Treatment Acres	Planted Acres to Date ¹	Initial Plant Acres ²	Release Treatment	Comment
609-032	47	0	0		None	Snag Patch
609-033	763	450	48	332	hand cut/hand grub	oak
609-034	20	20	20		hand cut/hand grub	
609-035	123	0	0		hand cut/hand grub	
609-036	28	28	28		hand cut/hand grub	
609-037	54	54	54		hand cut/hand grub	
609-038	21	21	21		hand cut/hand grub	
609-039	22	22	22		hand cut/hand grub	
609-040	27	27	27		hand cut/hand grub	
609-041	29	29	29		hand cut/hand grub	
609-042	66	66	66		hand cut/hand grub	
609-043	49	49	49		hand cut/hand grub	
609-044	37	37	37		hand cut/hand grub	
609-046	280	147	70	70	hand cut/hand grub	oak
613-005	120	120	120		hand cut/hand grub	
613-006	96	96	96		hand cut/hand grub	
613-007	17	17	17		hand cut/hand grub	
613-010	6	6	6		hand cut/hand grub	
613-022	28	28	28		hand cut/hand grub	
613-025	89	89	89		hand cut/hand grub	
613-026	19	19	19		hand cut/hand grub	
613-031	1	0	0		None	
613-035	150	150	150		hand cut/hand grub	
613-037	113	113	113		hand cut/hand grub	
613-038	51	51	51		hand cut/hand grub	
613-042	40	40	40		hand cut/hand grub	
613-047	32	32	12		hand cut/hand grub	
613-050	55	55	55		hand cut/hand grub	
613-051	90	90	90		hand cut/hand grub	
613-052	76	76	76		hand cut/hand grub	
613-053	153	38	38		hand cut/hand grub	Balance of unit green
613-054	43	43	43		hand cut/hand grub	
Total	3,816	2,588	1,868	592		

¹ Planted under existing Decision Memo

² Acreage figures reflect only those stands where dense bearclover occurs in greater than 10% of a stand's area. Small inclusions of dense bearclover are present in many stands.

³ Oak- Stands with portions that are oak, or where oak is a component of a mixed conifer/oak type

⁴ Snag Patch – Unharvested stand

Resource Protection Measures

- **To protect archaeological resources at risk from ground disturbing project activities:** Cultural resource sites would be flagged or otherwise designated. Tree

planting, hand release, and hand pulling of invasive plants would not take place within these sites.

- **To protect sensitive plants:** Conduct field surveys in the spring to verify the suitability of potential habitat for sensitive plants. Known occurrences of Pleasant Valley mariposa lily (*Calochortus clavatus*) would be flagged or otherwise designated by a trained Botanist. Tree planting and hand release treatments would not take place within these occurrences. Hand treatments (hand pulling or cutting) of invasive plants would be allowed after sensitive plant flowering and seed set. Any new occurrences of sensitive species within the project area will be flagged and protected by avoidance.
- **To manage perennial streams:** No conifer release treatments would occur within 50 feet of the edge of stream channels. Between 50 and 100 feet from the edge of stream channels, conifer hand release treatments would maintain a minimum of 50 percent live ground cover.
- **To protect water quality:** Compliance with the Clean Water Act is demonstrated through the implementation of Best Management Practices (BMPs) certified by the state, and then monitoring to determine if the appropriate Central Valley Regional Water Quality Control Board standards are met. These BMPs are designed to prevent degradation of downstream water quality. Water Quality Management for Forest Service Lands in California - Best Management Practices (2000) describes the BMPs that are referenced in the Land and Resource Management Plan. The BMPs that are pertinent to the use of mechanical equipment will be implemented. This includes: BMP's 1-6, 1-19, 2-12, 5-1, 5-2, 5-3, and 5-6.

Practice 1-6 – Protection of Unstable lands

To provide appropriate erosion and sedimentation protection for unstable areas there would be no ground-based entry of mastication equipment within 100 feet of any identified landslides, landslide prone lands or instabilities (such as mining ditches) or as determined by a geologist/soil scientist. This action would reduce the risk of triggering mass slope failure with resultant erosion and sedimentation.

Practice 1-19 - Streamcourse and Aquatic Protection

To control sediment and other pollutants from entering streamcourses, ground based entry of mastication equipment would not be allowed within 100 feet of perennial streams, lakes and reservoirs, meadows and springs, and 50 feet on each side of seasonal and ephemeral streams. Riparian vegetation would not be masticated.

Practice 2-12 - Servicing and Refueling of Equipment

To prevent pollutants from being discharged into streamcourses, all mechanized equipment will be refueled outside of Riparian Conservation Areas, if possible.

Practice 5-1 -Soil Disturbing/Treatments on the Contour

Sediment production and stream turbidity would be protected by minimizing the disturbance associated with turning of the equipment within the Riparian Conservation Areas.

Practice 5--2 - Slope Limitations for Mechanical Equipment Operation

To reduce gully and sheet erosion and associated sedimentation mechanical equipment will be restricted to slopes generally less than 35 percent. Within Riparian Conservation Areas, mechanical treatments would be minimized on moderate slopes (15-30 %) and restricted to slopes less than 30%.

Practice 5-3 - Tractor Operation is Limited in Wetlands and Meadows

To limit turbidity and sediment production in wetlands and meadows mastication equipment would not be allowed within 50 feet of meadows, springs, and wetlands.

Practice 5-6 - Soil Moisture Limitations for Mechanical Equipment Operations

To prevent compaction, rutting, and gullyng mechanical treatment activities would be restricted and/or controlled during high soil moisture conditions.

Monitoring (all Action Alternatives)

BMP monitoring: To provide further protection for beneficial uses of water, the validity of these assumptions is subject to verification through the Best Management Practices Evaluation Program (BMPEP). This program is designed for evaluating the implementation and effectiveness of BMPs in management activities.

Water quality monitoring: A water quality monitoring plan (BMP 5.9) is developed specifically for pesticide treatments. It would be implemented prior to application to determine baseline conditions. A hydrologist, soil scientist, and silviculturist would evaluate and interpret the results of the monitoring. This monitoring would determine if herbicides have moved off-site into water after application, through overland flow, leaching, or subsurface flow and would determine the amount of herbicide residue reaching water. This information would be critical to evaluating other protection measures.

Seedling survival and shrub monitoring: Survival monitoring will be conducted in the first and third years following planting and as needed thereafter to determine survival of planted conifer seedlings and needed follow-up treatment. Shrub monitoring will be conducted 5 years following planting to assess the fuel loading and need for follow-up fuel reduction treatments.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need.

An alternative that uses a variety of non-chemical methods to meet the purpose and need was proposed by the public. Non-chemical invasive plant control methods proposed include goat grazing, mowing, manual removal, burning, and biological control. Non-chemical site preparation and release methods proposed included mechanical, goat grazing, prescribed fire, hand grubbing, mechanical removal, mulching /covers, and torching/flaming.

Some non-chemical methods for site preparation, release, invasive plant control, and fuel reduction are included under Alternative 3. Alternative 3 proposes hand grubbing and hand cutting methods for site preparation and release, hand grubbing, hand pulling, and tarping methods for invasive plant control, and mechanical mastication for fuel reduction. In addition to chemical methods, Alternative 1 would also utilize hand grubbing for release within no herbicide buffer strips adjacent to aquatic features, hand grubbing, hand pulling, and tarping for invasive plant weed control, and mechanical mastication for fuel reduction.

Non chemical methods not considered in detail

Invasive plant control

Biological control: The goal of a biological control program is not to eradicate the target plant. Biological control can reduce densities and subsequent damage by invasive plants as part of an Integrated Pest Management program. While biological control may reduce spread because of reduced seed production, they do not contain invasive plants. The El Dorado County Agricultural Commissioner has an active Biological Control program for yellow starthistle in El Dorado County. Six species have been released into El Dorado County, five of which are routinely found in county traps. These include the bud weevil (*Bangasternus orientalis*); hairy weevil (*Eustenopus villosus*); flower weevil (*Larinus curtus*); the peacock fly (*Chaetorellia australis*); gall fly (*Urophora sirunaseva*); and yellow starthistle rust (*Puccinia jaceae*). Many of these insects are thought to be established on the ENF, although trapping is not routinely done in that vicinity (L. Mila, personal communication, 2008). This method was considered but dropped from detailed analysis because this method would not meet the project purpose and need to contain and control yellow starthistle and eliminate tall whitetop in the project area.

Mowing: Mowing as a weed control tool along trails and roadways is hampered by terrain limitations. Rocks, logs, and other native materials scattered through the treatment areas create additional difficulties for mowing. Based on the items listed, mowing could not be fully implemented and was therefore eliminated from detailed study in this analysis.

Goat grazing: Goats are not selective on the vegetation they eat. At a site on the Stanislaus National Forest, goats preferentially ate black oak, to the point of girdling them by eating their bark, reducing our ability to protect hardwoods. Goats also readily consumed the conifer species sugar pine and Douglas fir, reducing species heterogeneity (observation on a visit to a plantation being grazed by goats on the Stanislaus NF). Based on the potential that goats could remove conifer species and hardwoods while eating invasive species (not meeting the purpose and need) this method was eliminated from detailed study in this analysis.

Prescribed Fire: The use of prescribed fire was suggested as a means of controlling yellow starthistle. Areas outside of the ENF have been burned for yellow starthistle control. The time of year the burn would take place (late June to early July), following seed dispersal and senescence of desirable grasses and forbs but prior to viable starthistle seed production, would be well after the start of fire season on the ENF, which is generally between May 1st and June 1st. Because of the summer timing requirement, prescribed burning is perhaps the riskiest option for yellow starthistle management. Any escaped fire would be difficult to control in this area due to slopes, resulting in a high likelihood of conifer seedling mortality. In addition, with a major interstate at the bottom of the canyon it is highly unlikely that broadcast burning would be used. Broadcast burning would put large volume of smoke on the highway, threatening public safety. The mitigation for this would be to close the highway for the burning. This method was considered but dropped from detailed analysis because it could lead to high mortality of conifers and would not meet the project purpose and need to reestablish a forested landscape.

Reforestation and Site Preparation and Release

Where and when non-chemical treatments are effective has been well established through scientific methods (e.g. Click, et al., 1988; Fiddler and McDonald, 1983; McDonald and Fiddler, 1989) and extensive experience by the ENF (refer to Silviculture Report). Prior to 1989, when herbicide use was made available by the Region 5 Vegetation Management for Reforestation FEIS and ROD (USDA 1989b), non-chemical methods for reforestation and invasive plant control have been analyzed and utilized in the past on the ENF. Non-herbicide methods have been

implemented primarily in limited areas within larger reforestation projects. For example, hand cutting and grubbing has been used for release and invasive plant work within non-herbicide streamside zones. The lack of effectiveness of non-pesticide methods is a major concern. In some vegetation types (such as bearclover), reforestation without herbicide methods would have a high likelihood of failure to achieve both survival and growth objectives. Other vegetation types (such as sprouting shrubs, grasses and forbs) have more promise in achieving some degree of survival, but only at a high cost associated with replanting and repeated release treatments. Even if survival was achieved, projected growth of seedlings in these vegetation types would delay meeting objectives to accelerate the development of key habitat and old forest characteristics and reduce the risk of loss to wildland fire (SNFP ROD, page 49).

Mulching/covers: The use of mulch collars/mats around the trees can be effective on grasses and forbs, but are expensive to install and maintain. They have not proven to be effective on the species and size of vegetation (woody brush) most common in these units. This method was considered but dropped from detailed analysis because mulch collars/mats have not proven to be effective on the woody brush most common in these units, not meeting the project purpose and need to reestablish a forested landscape.

Mowing/Mechanical removal: Mowing as a conifer release tool is hampered by terrain limitations. Rocks, logs, and other native materials scattered through the treatment areas create additional difficulties for mowing. Mechanical removal involving mastication or uprooting is not feasible where seedlings are planted as seedlings would be difficult to see and suffer a high degree of mechanical damage/death. Most of the species in the project area would readily resprout if mown and live vegetation were left above ground, allowing these plants to continue to compete for moisture with conifer seedlings. These treatments were eliminated from detailed study in this analysis because they could not be fully implemented, and would cause high mortality to conifer seedlings, not meeting the project purpose and need to reestablish a forested landscape.

Goat grazing: See discussion under invasive plants, above.

Prescribed Fire: See discussion under invasive plants, above.

During the 45 day comment period of the Draft Environmental Impact Statement, an alternative that uses aerial application of herbicides to meet the purpose and need was proposed by the public. They felt that aerial application was less costly, and could still protect the environment.

Aerial Application of Herbicides

As a result of public comments the use of aerial application was suggested because of cost effectiveness, while still being able to protect the environment. Aerial application can cost less and can reduce risk to the public and to forest workers from the stand point of potential adverse effects to human health and safety if chemicals were to be utilized (USDA, 1989b). Aerial application of herbicides was not considered in detail for two reasons.

Project design features include the use of radial treatments in several areas to limit the potential for invasive plant spread (page 24) during initial treatment. Follow-up treatments with glyphosate and triclopyr also utilize radial treatments, with selected shrubs targeted outside of this radius to reduce live cover to 20 percent to allow some shrub and herbaceous vegetation development interspersed between the groups of trees (page 24). These design features would not be able to be met using aerial applications of herbicides.

The FEIS for Freds Fire Restoration required the retention of a high number of snags. These tall and numerous obstacles would not allow for efficient helicopter operations. Application from

these heights would increase herbicide drift, potentially impacting streams and other non-spray areas, requiring extensive untreated buffer strips to protect water quality. Based on the items listed, aerial application methods could not be fully implemented and was therefore eliminated from detailed study in this analysis.

Table 2-6. Comparison of Alternatives

Indicator Measure		Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3
Purpose and Need				
Reestablish a forested landscape				
Acres certified with adequate stocking by age five to ten		2,650-3,000	350-600	600-1,100
Reestablish this forested landscape effectively and economically				
Acres with competing vegetation levels below twenty percent (total live ground cover) for a period of two to three years after planting		Would meet goal on about 3,320 acres	None	Would meet goal within critical 5-foot circle around trees on about 2,460 acres, but would not meet short-term goal in units as a whole.
Growth (height and diameter (DBH)) at age 15 and 50	Age 15	Height - 22 feet Diameter - 6.4 inches	Height - 10 feet Diameter - 2.7 inches	Height - 11 feet Diameter - 3.1 inches
	Age 50	Height - 74 feet Diameter - 20 inches	Height - 35 feet Diameter - 9.4 inches	Height - 40 feet Diameter - 10.8 inches
Cost (total and per acre)		\$2,530,000 or \$762 per acre.	0	\$4,688,000 or \$1,906 per acre.
Reduce short term fuels loading				
Flame lengths in 90 th percentile weather conditions.		0-5 years – 7.3 feet 5-10 years – 5.4 feet 10-25 years - 5.4 feet 25+ years – 5.4 feet	0-5 years – 7.3 feet 5-10 years – 5.4 feet 10-25 years -5.5 feet 25+ years – 15.1 feet	Same as Alternative 2
Percentage of the area in grass or grass/shrub fuel model		Age 0-5 Grass Fuel model over 100% Age 5- 25+ Grass/shrub Fuel model over 85%	Age 0- 5 Grass Fuel model over 100% Age 5- 10 Grass/shrub Fuel model over 100% Age 10-25+ Shrub Fuel model over 100%	Same as Alternative 2
Restore spotted owl travel corridors between owl PACs				
Years to achieve spotted owl foraging and nesting habitat as described by CWHR types 4M/4D/5M/5D, where site conditions allow		Planted acres 4M/4D – 50 years 5M – 80 years 5D - 80 years	Planted acres 4M/4D - 150 years 5M - 150 years 5D - >150 years Unplanted acres unlikely to achieve 4M/4D/5M/5D within 150 years due to < 40% crown closure	Planted acres 4M/4D - 110 years 5M – 115 years 5D - >150 years Unplanted acres unlikely to achieve 4M/4D/5M/5D within 150 years due to < 40% crown closure
Control yellow starthistle and eliminate tall white top				
Containment of current yellow starthistle population or decreasing in size		Yes	No - yellow starthistle would continue to spread limited only by environmental factors.	No - hand methods are unlikely to be successful because of the size of the yellow starthistle infestation
Elimination of tall whitetop population		Yes	No	Yes

Indicator Measure	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3
Issues			
Herbicides represents an unknown or unacceptable risk to humans, wildlife, and the environment.			
Risk to human health and safety, based primarily on Hazard Quotients (HQ), measured by comparing the estimated level of exposure (dose) to the Reference dose (RfD) or some other index of acceptable exposure	Workers		

Indicator Measure	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3
	<p><u>Long-term:</u> No herbicides in streams.</p> <p>Aquatic and Terrestrial Species - Low overall risk (HQ<1) using project design features</p> <p>Accidental Spill –Some risk to surrogate species and algae. Project design features (BMPs) prevent or reduce effects of a spill</p>		
Proposed use of herbicides could create conditions more hospitable to invasive species and undesirable weeds than were present before the chemicals were applied			
Risk of increasing spread of invasive plants in the project area	<p><u>Short-term:</u> (<5 years) Increased risk of invasive plant invasion with broadcast herbicide treatments. Reduced risk of invasive plant invasion on 510 acres of radial treatments around documented infestations of yellow starthistle and cheatgrass.</p> <p><u>Long-term:</u> (> 20-25 years) Reduced risk of invasive plant spread with the establishment of a forested landscape.</p>	<p><u>Short-term:</u> Persistence in openings, but spread unlikely due to shrubs dominating site</p> <p><u>Long-term:</u> A higher risk of a large-scale high severity fire would potentially facilitate invasion plant expansion in open ground created such a fire.</p>	<p><u>Short-term:</u> Persistence in openings and radial treatment areas, but spread unlikely due to shrubs dominating site</p> <p><u>Long-term:</u> Similar to Alternative 2.</p>